

REQUEST FOR RECONSIDERATION

Applicants thank Examiner Nguyen for the helpful discussion of August 11, 2003. During the discussion the Examiner indicated that an amendment to the present independent Claim 15 to include a limitation previously considered in independent Claim 1 may not be a new issue for consideration since the limitation had previously been considered. Applicants further thank Examiner for indicating in the Office Action of May 16, 2003, that the proposed drawing corrections filed on September 11, 2002, are approved.

The Office rejected Claims 15 and 17-21 under 35 U.S.C. § 102(b) in view of a patent to Dye (U.S. 5,834,053). Applicants traverse the rejection on the grounds that the Dye patent nowhere discloses phosphor thin films containing alkaline earth thioaluminates.¹

Applicants respectfully request the withdrawal of the rejection of Claims 15 and 17-21 under 35 U.S.C. § 102.

The Office rejected Claim 16 under 35 U.S.C. § 103(a) in view of the combination of Dye and Miura (Jpn. J. Appl. Phys. Vol. 38 (1999) Pt. 2, No. 11B, pp. L1291-L1292). In making the rejection the Office asserted that Dye discloses substantially all the structure set forth in the claimed invention. The Office provided the Miura reference as a teaching of a barium thioaluminate phosphor.

The presence of a BaTiO₃ layer in the presently claimed EL phosphor multilayer thin film protects the phosphor layer from the diffusion of elements from the underlying layer (page 6, lines 2-4). Since the thioaluminate phosphor recited in present Claim 15 has a high crystallization temperature (page 6, lines 21-24) the diffusion of elements from the underlying layer into the phosphor thin film may be accelerated. However, this diffusion is prevented because a BaTiO₃ thin film separates the underlying layer from the phosphor thin film.

¹ Dye discloses thiogallate phosphors (column 1, line 9) but nowhere discloses thioaluminate phosphors.

This effect is demonstrated in the Examples. Example 1 is an EL phosphor laminate thin film that contains a $\text{BaTiO}_3\text{-PbTiO}_3$ substrate (underlying layer). This underlying structure is covered with a BaTiO_3 layer upon which is then deposited a barium thioaluminate thin film. The phosphor layer is then covered with a Ta_2O_5 insulating layer and an ITO electrode layer. This inventive example is able to provide a luminance of 650 cd/m^2 (page 18, line 34). A comparative example is prepared in the same fashion however a BaTiO_3 layer is not present between the phosphor thin film and the underlying structure. The comparative example is able to provide only a luminance of 100 cd/m^2 (page 19, line 6).

Analysis of the phosphor layer by Auger analysis shows that the phosphor layer of the inventive example does not contain the element Pb. Similar analysis of the comparative example detects the presence of Pb in the phosphor layer (page 19, lines 10-20). Further analysis reveals that the phosphor thin film of the inventive example has an increased amount of oxygen (page 19, lines 17-18). The increased oxygen may be due to diffusion of oxygen from the BaTiO_3 layer into the barium thioaluminate phosphor thin film. Therefore, the claimed EL phosphor laminate thin film is able to allow oxygen diffusion into the barium thioaluminate phosphor thin film while simultaneously preventing the diffusion of elements from the underlying structure into the phosphor thin film.

The inventive example, which adheres to the limitations of present Claim 15, exhibits a luminance that is more than 6 times greater ($>500\%$) than the luminance of the comparative example.

Oxygen enrichment of the barium thioaluminate thin film cannot occur in the structure of Miura since the phosphor layer of the prior art device is separated from any oxygen-containing layer by a ZnS buffer layer.

Applicants respectfully request the withdrawal of the rejection under 35 U.S.C. § 103(a).

Application No. 09/866,691
Reply to Office Action of May 16, 2003

Applicants submit the amendment to the claims places all now-pending claims in condition for allowance. Applicants respectfully request the withdrawal of the rejections and the passage of all now-pending claims to Issue.

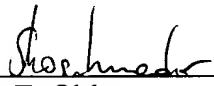
Respectfully submitted,

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